

REMARKS

The specification has been amended to return it to the form originally filed. The current specification as amended is the same as the original. Accordingly, no new matter has been added.

Claims 1, 4-9, and 11-19 were pending in the application. Claims 1, 4-9 and 11-19, stand rejected in the Final Office Action. Applicants have cancelled Claims 1, 4-9, and 11-19, and are offering new claims 20-38 with this Preliminary Amendment.

Support for the new claims is found throughout the specification as originally filed. For example, support for claim 20 is found in original claim 1, and in the specification at page 4, lines 17-22, and in Figures 1 and 2. Similarly, method claims 25 and 32 find support in the specification, claims, and Figures as filed. Applicants respectfully request entry of the amendments.

Rejections Under 35 U.S.C. §102(b)

Claims 1, 4, 16, and 17 are rejected in the Final Rejection under §102(b) over the Karmaschek reference (U.S. Patent 5,584,946). Applicants respectfully traverse the rejection as applied to the new claims and request reconsideration.

As stated in the Office Action on page 3, the Karmaschek reference does not disclose a weld stud as the part to be welded. New independent claim 20 is drawn to an aluminum weld stud, while method claims 25 and 32 are drawn to methods for attaching weld studs to a substrate which may be an auto body panel. Because the Karmaschek reference fails to disclose at least one feature of all of the new claims, Applicants respectfully request the rejection be withdrawn.

Rejections Under 35 U.S.C. §103

Claims 9, 11, 18 and 19, are rejected in the Final Rejection under §103 as obvious over the Karmaschek reference in view of the Konnert reference (U.S. Patent 4,326,894).

Additionally claims 5-8 and 12-15 are rejected as obvious over the Karmaschek reference and the Konnert reference and further in view of the Dash reference (U.S. Patent 2,858,414).

Applicants have canceled the rejected claims and believe the newly offered claims are patentable over the cited references for the reasons discussed below. Accordingly, Applicants respectfully traverse the rejections as they apply to the new claims and request reconsideration.

The new claims will be discussed in light of the Dash reference in combination with Karmaschek and Konnert. New claim 20 recites an aluminum weld stud, while new independent method claims 25 and 32 are drawn to processes that entail arc welding an aluminum weld stud to a substrate. As noted in the Final Rejection, the Karmaschek and Konnert references do not teach or suggest aluminum weld studs or methods for their use. Accordingly, Applicants respectfully request that the rejections over the Karmaschek reference and the Konnert reference be withdrawn.

The Karmaschek reference discloses a method for pre-treating an aluminum substrate by exposing it to a solution of, inter alia, complex fluorides such as TiF_6^{2-} before a second permanently corrosion-preventing conversion treatment, preferably chromating. See Karmaschek, column 5, lines 14-45. The Karmaschek reference contemplates that after the pretreatment step the aluminum parts may be joined to one another or to other steel parts, particularly by electrical resistance welding. Id., column 6, lines 58-62. As such, the Karmaschek reference fails to disclose or suggest aluminum weld studs adaptable to be arc

welded to substrates, including aluminum substrates. Applicants further respectfully submit that the Konnert reference does not overcome the deficiencies in this regard.

The Dash reference when combined with the Karmaschek reference does not cause one of skill in the art to arrive at the subject matter of new claims 20, 25, and 32. The Dash reference, titled "Aluminum Coated Stud", in fact discloses studs made of steel to which a portion of aluminum is added to provide a welding flux. See generally, columns 1 and 2. The presence of the aluminum coating on the studs aids in the formation of a sound weld. Column 3, line 70-73. The new claims recite compositions and methods for attaching aluminum studs to a substrate by arc welding. In light of the discussion below, the references do not teach or suggest the subject matter of the claims.

The proper inquiry of obviousness of claims over a combination of references is whether the invention as a whole would have been obvious in light of the teaching of the references. The invention as a whole includes not only the subject matter literally recited in the claims, but to those properties that are inherent and disclosed in the specification. *In re Antonie*. The invention includes the ease with which aluminum studs can be joined to a substrate by arc welding by practicing the invention. The references when combined do not suggest a solution to the problems associated with arc welding aluminum studs to substrates. Therefore they can not be held to make the invention as a whole obvious to a person of skill in the art.

A problem associated with arc welding of aluminum, and particularly of arc welding an aluminum stud to a substrate, is the problem of "blow" discussed in the current specification on page 2, beginning at line 11. The problem is caused by the aluminum oxide that naturally forms on an aluminum part upon exposure to air. When the oxide builds up unevenly, it causes uneven and inconsistent arcing between stud and substrate. As discussed in the

specification, this can lead to welds of poor quality. Applicants have discovered a way of overcoming the problem of blow in arc welding of aluminum studs involving forming a titanium containing material on a surface of an aluminum stud prior to welding. Although not limited to theory, the titanium containing material appears to either hinder the growth of an aluminum oxide layer, or make the growth more even and uniform so that blow can be mitigated.

While the current method claims are drawn to methods of arc welding, the Karmaschek reference discloses electrical resistance welding, in which the challenge to weld quality presented by blow is not presented. In electrical resistance welding, there is no arc, so there is no problem of blow. Resistance welding involves contact between two materials, along with the application of force before, during and after applying current - preferably impulses of relatively short duration of low voltage, high density, electric current. The periodic high density electric current supplies the heat to forge the contacted parts together, accomplishing the weld. In arc welding on the other hand, two materials are held apart from one another and an electrical arc is produced between them. The heat generated by the arc is sufficient to fuse the materials and form a weld. In light of the discussion above, Applicants respectfully submit that the current claims, drawn to a surface treated aluminum stud, and to methods for joining such studs to substrates by a process of arc welding, are neither disclosed nor suggested by the cited references.

Read in its entirety, the Dash reference does not teach or suggest an aluminum weld stud, so that the subject matter of the claims may not be arrived at even if the two references are combined. The problem of blow is also not presented in Dash. As such it does not make up for the deficiencies of the Karmaschek reference -- the Dash reference taken in combination with the Karmaschek reference does not disclose or suggest the methods of claims

25 and 32, wherein an aluminum stud containing a welding face having a titanium containing material is arc welded to a substrate such as an aluminum sheet, particularly an automotive body panel.

CONCLUSIONS

For the reasons discussed above, applicants believe that claims 20—38 are in an allowable condition and respectfully request an early notice of such allowance. The Examiner is invited to telephone the undersigned if that would be helpful to resolving any issue.

Respectfully submitted,

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